AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
003	07/11/2014		

6. ISSUED BY CODE CPOD

CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

R T I International
PO BOX 12194
RESEARCH TRIANGLE PARK NC 277092194

CODE (b)(4) FACILITY CODE

(x) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED *(SEE ITEM 11)*

x 10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-11-036
0004

10B. DATED *(SEE ITEM 13)* 06/11/2012

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ *The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers* ☐ is extended, ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)* Net Decrease: -$12.85
See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Limitation of Funds Notice
	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☒ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

DUNS Number: (b)(4)
The purpose of this modification is to de-obligate funding from the Task Order in conjunction with the ULO (Unliquidated Obligations) exercise.
TOPO: William M. Barrett
LIST OF CHANGES:

Reason for Modification : Funding Only Action

Obligated Amount for this Modification: -$12.85

Incremental Funded Amount changed
Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*	16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*
	Camille W. Davis

15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B.	16C. DATE SIGNED
(Signature of person authorized to sign)		Camille W. Davis ELECTRONIC SIGNATURE	07/11/2014

NSN 7540-01-152-8070
Previous edition unusable

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	From: $124,991.00 To: $124,978.15 CHANGES FOR ACCOUNTING CODE: 12-T-72DP-303DD2-2505-HQ00BM00-1272DP5004-001 Amount changed from $0.00 to $119,987.15 The Incremental funding amount for this line item is changed to read as follows: Cost: $(b)(4) Fee: $ Total: $119,987.15 Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center Mail Drop D143-02 109 TW Alexander Drive Durham NC 27711 FOB: Destination Period of Performance: 06/11/2012 to 01/31/2014				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
002	See Block 16C		

6. ISSUED BY CODE CPOD

CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

R T I International
PO BOX 12194
RESEARCH TRIANGLE PARK NC 277092194

CODE (b)(4) FACILITY CODE

(x) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED *(SEE ITEM 11)*

x 10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-11-036
0004

10B. DATED *(SEE ITEM 13)* 06/11/2012

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*
See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
X	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF: Changes-Cost-reimbursement, FAR 52.243-2
	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not, ☒ is required to sign this document and return 1 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

DUNS Number: (b)(4)
TOPO: William M. Barrett
LIST OF CHANGES:
Reason for Modification : Supplemental Agreement

Total Amount for this Modification: $0.00

The purpose of this modification is to revise the deliverable due date for the updated model parameters From: 120 days after Task Order Award Date TO: 270 days after Task Order Award Date. The due date revision is to allow for additional time for RTI to obtain sample data results and to conduct the data analysis. This is a No Cost change. The end date for

Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
		Camille W. Davis	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
_____ *(Signature of person authorized to sign)*		_____ *(Signature of Contracting Officer)*	

NAME OF OFFEROR OR CONTRACTOR
R T I International

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	the entire Task Order remains January 31, 2014. Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center Mail Drop D143-02 109 TW Alexander Drive Durham NC 27711 Period of Performance: 06/11/2012 to 01/31/2014				

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 2

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
001	08/03/2012	PR-ORD-12-02577	

6. ISSUED BY CODE CPOD

CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

7. ADMINISTERED BY *(If other than Item 6)* CODE CPOD

CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

RESEARCH TRIANGLE INSTITUTE
PO BOX 12194
RESEARCH TRIANGLE PARK NC 277092194

CODE (b)(4) FACILITY CODE

(x) 9A. AMENDMENT OF SOLICITATION NO.

9B. DATED *(SEE ITEM 11)*

x 10A. MODIFICATION OF CONTRACT/ORDER NO. EP-C-11-036
0004

10B. DATED *(SEE ITEM 13)* 06/11/2012

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)* Net Increase: $4,991.00
See Schedule

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER *(Specify type of modification and authority)* Limitation of Funds Notice

E. IMPORTANT: Contractor ☒ is not, ☐ is required to sign this document and return 0 copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

DUNS Number: (b)(4)
The purpose of this modification is to add incremental funding to fully fund the Task Order.
TOPO: William M. Barrett
LIST OF CHANGES:
Reason for Modification : Funding Only Action
Obligated Amount for this Modification: $4,991.00
New Total Obligated Amount for this Award: $124,991.00
Incremental Funded Amount changed From $120,000.00 to $124,991.00.

CHANGES FOR LINE ITEM NUMBER: 10
Obligated Amount for this modification: $4,991.00
Continued ...

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
		Camille W. Davis	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
_____ *(Signature of person authorized to sign)*		_____ *(Signature of Contracting Officer)*	08/03/2012

NSN 7540-01-152-8070
Previous edition unusable

STANDARD FORM 30 (REV. 10-83)
Prescribed by GSA
FAR (48 CFR) 53.243

NAME OF OFFEROR OR CONTRACTOR
RESEARCH TRIANGLE INSTITUTE

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	Incremental Funded Amount changed from $120,000.00 to $124,991.00 NEW ACCOUNTING CODE ADDED: Account code: 12-T-72DP-303DD2-2505-HQ00BM00-1272DP5021-001 Beginning FiscalYear 12 Ending Fiscal Year Fund (Appropriation) T Budget Organization 72DP Quantity: 0 Amount: $4,991.00 Delivery Location Code: NRMRL CINCINNATI NRMRL CINCINNATI US Environmental Protection Agency National Risk Mgmt Research Lab 26 West Martin Luther King Drive Cincinnati OH 45268 USA Payment: RTP Finance Center US Environmental Protection Agency RTP-Finance Center Mail Drop D143-02 109 TW Alexander Drive Durham NC 27711 FOB: Destination Period of Performance: 06/11/2012 to 01/31/2014				

ORDER FOR SUPPLIES OR SERVICES

PAGE 1 OF PAGES 21

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: 06/11/2012	2. CONTRACT NO. (If any): EP-C-11-036
3. ORDER NO.: 0004	4. REQUISITION/REFERENCE NO.: PR-ORD-12-00746

5. ISSUING OFFICE (Address correspondence to):
CPOD
US Environmental Protection Agency
26 West Martin Luther King Drive
Mail Code: NWD
Cincinnati OH 45268

6. SHIP TO:
a. NAME OF CONSIGNEE: NRMRL CINCINNATI
b. STREET ADDRESS: US Environmental Protection Agency
National Risk Mgmt Research Lab
26 West Martin Luther King Drive
c. CITY: Cincinnati
d. STATE: OH
e. ZIP CODE: 45268

7. TO:
a. NAME OF CONTRACTOR: RESEARCH TRIANGLE INSTITUTE
b. COMPANY NAME:
c. STREET ADDRESS: PO BOX 12194
d. CITY: RESEARCH TRIANGLE PARK
e. STATE: NC
f. ZIP CODE: 277092194

f. SHIP VIA:

8. TYPE OF ORDER
☐ a. PURCHASE
REFERENCE YOUR:
Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.
☒ b. DELIVERY
Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. ACCOUNTING AND APPROPRIATION DATA: See Schedule

10. REQUISITIONING OFFICE: CPOD

11. BUSINESS CLASSIFICATION (Check appropriate box(es))
☐ a. SMALL ☒ b. OTHER THAN SMALL ☐ c. DISADVANTAGED ☐ d. WOMEN-OWNED ☐ e. HUBZone
☐ f. SERVICE-DISABLED VETERAN-OWNED ☐ g. WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOMEN-OWNED SMALL BUSINESS PROGRAM ☐ h. ECONOMICALLY DISADVANTAGED WOMEN-OWNED SMALL BUSINESS (EDWOSB)

12. F.O.B. POINT: Destination

13. PLACE OF		14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	16. DISCOUNT TERMS
a. INSPECTION: Destination	b. ACCEPTANCE: Destination			

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	DUNS Number: (b)(4) Phase 4 Evaluation of the Aerosolization of Asbestos and Related Fibers from Bulk Materials TOPO: William M. Barrett Continued ...					

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	17(h) TOTAL (Cont. pages)

21. MAIL INVOICE TO:

SEE BILLING INSTRUCTIONS ON REVERSE

a. NAME: RTP Finance Center — $0.00

b. STREET ADDRESS (or P.O. Box): US Environmental Protection Agency
RTP-Finance Center
Mail Drop D143-02
109 TW Alexander Drive

17(i) GRAND TOTAL: $124,991.00

c. CITY: Durham
d. STATE: NC
e. ZIP CODE: 27711

22. UNITED STATES OF AMERICA BY (Signature):

23. NAME (Typed): Camille W. Davis
TITLE: CONTRACTING/ORDERING OFFICER

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

DATE OF ORDER	CONTRACT NO.	ORDER NO.
06/11/2012	EP-C-11-036	0004

ITEM NO. (a)	SUPPLIES/SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Admin Office: CPOD US Environmental Protection Agency 26 West Martin Luther King Drive Mail Code: NWD Cincinnati OH 45268 Accounting Info: 12-T-72DP-303DD2-2505-HQ00BM00-1272DP5004-00 1 BFY: 12 Fund: T Budget Org: 72DP Program (PRC): 303DD2 Budget (BOC): 2505 Job #: HQ00BM00 DCN - Line ID: 1272DP5004-001 Period of Performance: 06/11/2012 to 01/31/2014					
00010	Report Preparation and Peer Review The obligated amount of award: $120,000.00. The total for this award is					

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H)) $0.00

PERFORMANCE WORK STATEMENT
STREAMS II
Task Order 0004, RTI EP-C-11-036

TITLE: Phase 4 Evaluation of the Aerosolization of Asbestos and Related Fibers from Bulk Materials

Task Order Manager (TOM)	**Alternate Task Order Manager (ATOM)**
Name: Williamm Barrett	Name: David Ferguson
Office: ORD/NRMRL/STD 26 W. Martin Luther King Drive Cincinnati, OH 45268	Office: ORD/NRMRL/STD 26 W. Martin Luther King Drive Cincinnati, OH 45268
Phone: (513) 569-7220	Phone: (513) 541-7194
Fax: (513) 569-7111	Fax: (513) 541-7111
Email: Barrett.Williamm@epa.gov	Email: Meyer.David@epa.gov

PERIOD OF PERFORMANCE: June 11, 2012 through January 31, 2014

BACKGROUND

The United States Environmental Protection Agency (USEPA) Office of Research and Development (ORD) studied the releasability or aerosolization of asbestos and related mineral fibers from soils and other bulk media under previous contract Task Orders. Under the tasks, the outdoor Releasable Asbestos Field Sampler (RAFS) test apparatus was designed and built for use in determining the releasability of asbestos from soil.

Field studies of the outdoor RAFS unit were conducted, and a computer-based model was developed that correlates the releasable asbestos concentrations from the RAFS unit to breathing zone concentrations obtained from activity-based sampling (ABS) conducted by EPA's Regional Offices. In addition, soil samples were collected from locations where RAFS and ABS sampling were conducted, and these samples were submitted to the Region 10 laboratory for analysis using the Fluidized Bed Asbestos Segregator (FBAS) developed jointly by the Idaho National Laboratory and Region 10. These soil samples were also analyzed for asbestos, using polarized light microscopy (PLM).

The breathing zone model provides an estimate of the level of asbestos airborne concentrations that could be expected from sources under certain environmental conditions while conducting different disturbances or activities. Field data have been collected to broaden the applicability of the breathing zone model and to improve the correlation between ABS and RAFS data. Improving the quality of the breathing zone model results would improve risk management decisions.

The research conducted under this task will include analysis of data collected as part of the previous task orders to evaluate the relationship between ABS, RAFS, FBAS, and PLM methods. Soil data will also be reduced to improve the parameters of the breathing zone model.

The task will involve the preparation of a final report for the RAFS development project. This report will discuss development of the RAFS device and the breathing zone model, as well as provide statistical comparisons of the RAFS results to PLM, ABS and the FBAS. This report will be subject to a formal EPA peer review, which the contractor will participate in and defend the final report.

This is an applied research/technology evaluation project subject to *Category 3* Quality Assurance requirements.

TASK

Report Preparation and Peer Review

Based on the results obtained under the previous task orders, the model developed shall be updated and/or modified to incorporate additional data obtained.

NRMRL personnel will be provided with model equations and parameters to prepare a computer application that makes use of these model equations to predict potential ABS exposures. The model calculations shall be verified by contractor personnel to ensure conformance with the model equations and validate calculation results. The contractor shall perform alpha and beta testing of the model software package.

The USEPA desires to have the final report documenting the findings, data, and model verifications calculations subjected to a formal, external peer review. The contractor shall prepare a final report of the RAFS development and model parameter determination for the formal peer review panel. The contractor will be present during the peer review to answer any questions of the peer review panel members or general public in attendance at the peer review meeting. The contractor will prepare written responses to the peer review comments, and revise the report based upon those comments.

The contractor shall provide computerized versions of all data, models, associated code, statistical evaluations, and other materials generated for this project as well as detailed description of these materials or instructions for their use.

DELIVERY ORDER SCHEDULE

Report Preparation and Peer Review

DELIVERY ITEM	DELIVERY DUE DATE
Contractor shall submit updated model parameters to the EPA.	120 days after Task Order Award Date
EPA shall deliver a completed Visual Basic-based breathing zone that incorporates these parameters to the contractor for Independent Verification and Validation	150 days after Task Order Award Date

Contractor shall deliver a Draft final report of the method comparison report, including a comparison of the RAFS, ABS, FBAS, and breathing zone model results.	270 days after Task Order Award Date
EPA will provide review comments on the final report	330 days after Task Order Award Date
Contractor will provide the Final report for external peer review	360 days after Task Order Award Date
The peer review panel will be convened	420 days after Task Order Award Date
EPA will provide peer review comments to be addressed by the contractor.	450 days after Task Order Award Date
Contractor will submit a Final report that addresses peer review comments.	600 days after Task Order Award Date

Attachment: NRMRL QA Requirements and Definitions

ATTACHMENT #1
TO THE STATEMENT OF WORK

NRMRL QA Requirements and Definitions

EPA's Quality System Website: http://www.epa.gov/quality/

EPA's Requirements and Guidance Documents: http://www.epa.gov/quality/qa_docs.html

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation described herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The QAPP shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government.

Definitions:

Environmental Data - These are any measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. For EPA, environmental data include information collected directly from measurements, produced from software and models, and compiled from other sources such as data bases or the literature.

Quality Assurance (QA) - Quality assurance is a system of management activities to ensure that a process, item, or service is of the type and quality needed by the customer. It deals with setting policy and running an administrative system of management controls that cover planning, implementation, and review of data collection activities and the use of data in decision making. Quality assurance is just one part of a quality system.

Quality Assurance Project Plan (QAPP) - A QAPP is a document that describes the necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. A QAPP documents project-specific information.

Quality Control (QC) - Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, that are needed to acquire data of known and adequate quality.

Quality Management Plan (QMP) - A QMP is a document that describes an organization's/program's quality system in terms of the organizational structure, policy and procedures, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, documenting, and assessing all activities conducted. A QMP documents the overall organization/program, and is primarily applicable to multi-year, multi-project efforts. An organization's/program's QMP shall address all elements listed in the "Requirements for Quality Management Plans" in Appendix B of the NRMRL QMP.

Quality System - A quality system is the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization and for carrying out required quality assurance and quality control activities.

R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001, http://www.epa.gov/quality/qs-docs/r2-final.pdf

R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001 http://www.epa.gov/quality/qs-docs/r5-final.pdf

Substantive Change - Substantive change is any change in an activity that may alter the quality of data being used, generated, or gathered.

NRMRL's Quality System Specifications:

(1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;

(2) an organizational chart showing the position of the QA function;

(3) delineation of the authority and responsibilities of the QA function;

(4) the background and experience of the QA personnel who will be assigned to the project; and

(5) the organization's general approach for accomplishing the QA specifications in the SOW.

Category Level Designations (determines the level of QA required):

__ **Category I Project** - applicable to studies performed to generate data used for enforcement activities, litigation, or research project involving human subjects. The QAPP shall address all elements listed in R-5.

__ **Category II Project** - applicable to studies performed to generate data used in support of the development of environmental regulations or standards. The QAPP shall address all elements listed in R-5.

X **Category III Project** - applicable to projects involving applied research or technology evaluations. The QAPP shall address the applicable sections of R-5, as outlined in the NRMRL QAPP requirements for the specific project type (see below).

__ **Category IV Project** - applicable to projects involving basic research or preliminary data gathering activities. The QAPP shall address the applicable sections of R-5, as outlined in the NRMRL QAPP requirements for the specific project type (see below).

Guidance for QAPPs by Project Type (described in more detail on subsequent pages):

These outlines of NRMRL QAPP Requirements for various project types, from Appendix B of the NRMRL QMP (except where otherwise noted), are condensed from typically applicable sections of R-5 (EPA Requirements for QA Project Plans) and are intended to serve as a starting point when preparing a QAPP. These lists and their format may not fit every research scenario, and QAPPs must conform to applicable sections of R-5 in a way that fully describes the research plan and appropriate QA and QC measures to ensure that the data are of adequate quality and quantity to fit their intended purpose.

X **Applied Research Project** - pertains to a study performed to generate data to demonstrate the performance of accepted processes or technologies under defined conditions. These studies are often pilot- or field-scale. Additional guidance is given in "QAPP Requirements for Applied Research Projects" (attached).

__ **Basic Research Project** - pertains to a study performed to generate data used to evaluate unproven theories, processes, or technologies. These studies are often bench-scale. Additional guidance is given in "QAPP Requirements for Basic Research Projects".

__ **Design, Construction, and/or Operation of Environmental Technology Project** - pertains to engineering projects involving environmental technologies, an all inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from or prevent them from entering the environment. Comprehensive guidance can be found in the EPA Quality System document "Guidance on Quality Assurance for Environmental Technology Design, Construction, and Operation" G-11, at http://www.epa.gov/quality/qs-docs/g11-final-05.pdf.

X **Method Development Project** - pertains to situations where there is no existing standard method, or a standard method needs to be significantly modified for a specific application. Additional guidance is given in "QAPP Requirements for Method Development Projects"

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X **Model Development Project** - includes all types of mathematical models including static, dynamic, deterministic, stochastic, mechanistic, empirical, etc. Comprehensive guidance is provided in the EPA Quality System document "Guidance for Quality Assurance Project Plans for Modeling" G-5M, http://www.epa.gov/quality/qs-docs/g5m-final.pdf. Abbreviated guidance is provided in "QAPP Requirements for Research Model Development and Application Projects" (attached).

X **Sampling and Analysis Project** - pertains to the collection and analysis of samples with no objectives other than to provide characterization or monitoring information. Additional guidance is given in "QAPP Requirements for Sampling and Analysis Projects".

__ **Secondary Data Project** - pertains to environmental data collected from other sources, by or for EPA, that are used for purposes other than those originally intended. Sources may include: literature, industry surveys, compilations from computerized databases and information systems, and computerized or mathematical models of environmental processes. Additional guidance is given in "QAPP Requirements for Secondary Data Projects".

X **Software Development Project** - pertains to projects dealing with software development or data management and includes all types of software/hardware systems development, data base design and maintenance, and data validation and verification systems. Additional guidance is given in "QAPP Requirements for Software and Data Management Projects".

QAPP REQUIREMENTS FOR APPLIED RESEARCH PROJECTS

An applied research project is a study to demonstrate the performance of technologies under defined conditions. These studies are often pilot- or field-scale. The following requirements should be addressed as applicable.

SECTION 0.0 DISTRIBUTION LIST

A distribution list shall be provided to facilitate the distribution of the most recent current version of the QAPP to all the principal project participants.

SECTION 1.0 PROJECT DESCRIPTION AND OBJECTIVES

1.1 The purpose of study shall be clearly stated.

1.2 The process, site, facility, and/or environmental system to be tested shall be described.

1.3 Project objectives shall be clearly stated and identified as primary or non-primary.

SECTION 2.0 PROJECT ORGANIZATION

2.1 Key points of contact for each organization involved in the project shall be identified.

2.2 All QA Managers and their relationship in the organizations (*i.e.*, location within each organization) shall be identified with evidence that the QA Manager is independent of project management.

2.3 Responsibilities of all other project participants and their relationship to other project participants shall be identified, meaning that organizations responsible for planning, coordination, sample collection, sample custody, measurements (*i.e.*, analytical, physical, and process), data reduction, data validation, and report preparation shall be clearly identified.

SECTION 3.0 EXPERIMENTAL APPROACH

3.1 The general approach and the test conditions for each experimental phase shall be provided. The statistical methods that will be used to evaluate the data (*i.e.*, ANOVA, or summary statistics) should be identified.

(NOTE: As deemed appropriate to the project by the TLP, the information requested in Sections 3.2, 3.3, and 3.4 may be presented here or in Section 4; the information requested in Sections 3.5 may be presented here or in Section 5; and the information requested in Sections 3.6 may be presented here or in Section 7.)

3.2 The sampling strategy shall be included and evidence must be presented to demonstrate that the strategy is appropriate for meeting primary project objectives, *i.e.*, a description of the statistical method or scientific rationale used to select sample sites and number of samples shall be provided.

3.3 Sampling/monitoring points for all measurements (*i.e.*, including locations and access points) shall be identified.

3.4 The frequency of sampling/monitoring events, as well as the numbers for each sample type and/or location shall be provided, including QC and reserve samples.

3.5 All measurements (*i.e.*, analytical [chemical, microbiological, assays], physical, and process) shall be identified for each sample type or process, and project-specific target analytes shall be listed and classified as critical or noncritical in the QAPP.

3.6 The planned approach (statistical and/or non-statistical) for evaluating project objectives shall be included.

SECTION 4.0 SAMPLING PROCEDURES

4.1 Whenever applicable, the method used to establish steady-state conditions shall be described.

4.2 Known site-specific factors that may affect sampling/monitoring procedures shall be described.

4.3 Any site preparation needed prior to sampling/monitoring shall be described.

4.4 Each sampling/monitoring procedure to be used shall be discussed or referenced. If compositing or splitting samples, those procedures shall be described.

4.5 For samples requiring a split sample for either QA/QC purposes or for shipment to a different laboratory, the QAPP shall identify who is responsible for splitting samples, and where the splitting is performed (*e.g.*, field versus lab).

4.6 If sampling/monitoring equipment is used to collect critical measurement data (*i.e.*, used to calculate the final concentration of a critical parameter), the QAPP shall describe how the sampling equipment is calibrated, the frequency at which it is calibrated, and the acceptance criteria for calibration or calibration verification, as appropriate.

4.7 If sampling/monitoring equipment is used to collect critical measurement data, the QAPP shall describe how cross-contamination between samples is avoided.

4.8 The QAPP shall include a discussion of the procedures to be used to assure that representative samples are collected.

4.9 A list of sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis, shall be specified.

4.10 Containers used for sample collection, transport, and storage for each sample type shall be described.

4.11 The method for uniquely identifying each samples shall be described.

4.12 Sample preservation methods (*e.g.*, refrigeration, acidification, *etc.*), including specific reagents, equipment, and supplies required for sample preservation shall be described.

4.13 Holding time requirements shall be noted.

4.14 Procedures for packing and shipping samples shall be described.

4.15 Procedures to maintain chain-of-custody (*e.g.*, custody seals, records) during transfer from the field to the laboratory, in the laboratory, and among contractors and subcontractors shall be described to ensure that sample integrity is maintained.

4.16 Sample archival requirements for each relevant organization shall be provided.

SECTION 5.0 TESTING AND MEASUREMENT PROTOCOLS

5.1 Each measurement method to be used shall be described in detail or referenced. Modifications to EPA-approved or similarly validated methods shall be specified.

5.2 For unproven methods, verification data applicable to expected matrices shall be included in the QAPP meaning the QAPP shall provide evidence that the proposed method is capable of achieving the desired performance.

5.3 For measurements which require a calibrated system, the QAPP shall include specific calibration procedures applicable to each project target analyte, and the procedures for verifying both initial and continuing calibrations (including frequency and acceptance criteria, and corrective actions to be performed if acceptance criteria are not met).

SECTION 6.0 QA/QC CHECKS

6.1 At a minimum, the QAPP shall include quantitative acceptance criteria for QA objectives associated with accuracy, precision, detection limits, and completeness for critical measurements (process, physical, and analytical, as applicable) for each matrix.

6.2 Any additional project-specific QA objectives shall be presented, including acceptance criteria. This includes items such as mass balance requirements.

6.3 The specific procedures used to assess all identified QA objectives shall be fully described.

6.4 The QAPP shall list and define all other QC checks and/or procedures (*e.g.*, blanks, surrogates, controls, *etc.*) used for the project, both field and laboratory.

6.5 For each specified QC check or procedure, required frequencies, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met shall be included.

SECTION 7.0 DATA REPORTING, DATA REDUCTION, AND DATA VALIDATION

7.1 The reporting requirements (*e.g.*, units, reporting method [wet or dry]) for each measurement and matrix shall be identified.

7.2 The deliverables expected from each organization responsible for field and laboratory activities shall be listed.

7.3 Data reduction procedures specific to the project, and also specific to each organization, shall be summarized.

7.4 Data validation procedures specific to each organization used to ensure the reporting of accurate project data to internal and external clients shall be summarized.

7.5 Data storage requirements for each organization shall be provided.

7.6 The product document that will be prepared for the project shall be specified (*e.g.*, journal article, final report, *etc.*). The contents of this document can be referenced to a NRMRL or program-specific QMP, if appropriate.

SECTION 8.0 ASSESSMENTS

8.1 The QAPP shall identify all scheduled audits (*i.e.*, both technical system audits [TSAs] and performance evaluations [PEs]) to be performed, who will perform these audits, and who will receive the audit reports.

8.2 The QAPP shall provide procedures that are to be followed that will ensure that necessary corrective actions will be performed.

8.3 The responsible party(-ies) for implementing corrective actions shall be identified.

SECTION 9.0 REFERENCES

References shall be provided either in the body of the text as footnotes or in a separate section.

NRMRL QAPP REQUIREMENTS FOR RESEARCH MODEL DEVELOPMENT AND APPLICATION PROJECTS

A research model project is a study performed to develop a new model or apply an existing model to provide information to support non-regulatory environmental research or decision-making. A QAPP must be submitted at the beginning of a research model development or application project. The QAPP should specify the quality requirements needed to ensure the quality of the results produced by the model. The recommended format for research model development QAPPs is presented below; guidance for completing each section is provided in italics. (For model application projects, a smaller subset of requirements needs to be addressed, as appropriate; e.g., information on code development would not be included.) If data will be generated to develop or calibrate the model, a separate QAPP is needed and should address the requirements applicable to the type of research project (e.g., basic research, applied research). If a model will be developed to support regulatory environmental decision-making, additional requirements may apply. The Division QA Manager should be consulted.

SECTION 1.0 PROJECT DESCRIPTION

1.1 Discuss the scope and purpose of the model.

Provide a brief statement of the scope and purpose. The specific problem which needs to be addressed should be discussed, including the intended users of the model.

1.2 Identify the project's objectives.

Discuss the specific objectives for this project, including the expected product and a timetable for completion.

1.3 Identify the roles and responsibilities of all project participants and support facilities.

Identify project personnel and key support facilities (including computer facilities). Discuss the duties/responsibilities for each. An organizational chart can be used to show lines of authority and communication.

SECTION 2.0 MODEL DESCRIPTION

2.1 Discuss the model parameters, including the theoretical approach for the model and the mathematical relationship between input and output variables.

Provide an overview of the model parameters, including:

- *model origin and its original purpose, if applicable*
- *parameters and variables*
- *the algorithms and equations that have been developed to support the model theory, along with the sources of the algorithms*

- *spatial extent (individual, group, population)*
- *spatial resolution (location independent/dependent, dimensionality)*
- *temporal extent (length of modeling period)*
- *temporal resolution (time step)*
- *model structure (e.g., stochastic vs deterministic, structural framework).*

2.2 Discuss any initial assumptions regarding model development/application.

Initial assumptions made during model development should be identified.

2.3 Specify required sources for model databases and any requirements for these data (e.g., quality, quantity, spatial, and temporal applicability). If data sources are not currently known, describe the criteria used to identify sources.

The purpose of assessing data quality is to evaluate, to the extent possible, the reliability of the existing data base(s). Procedures for determining precision, accuracy, representativeness, completeness, and comparability of existing data should be summarized. Specific parameters to be discussed include:

- *source of data and criteria for acceptance or rejection*
- *any modifications from existing data*
- *data format, maintenance, and archiving.*

SECTION 3.0 MODEL DEVELOPMENT

3.1 Discuss requirements for code development.

QA procedures for code development should include complete record keeping of the model development and of modifications made in the code. Required records include:

- *-assumptions*
- *parameter values and sources*
- *changes and verification of changes made in code*
- *output of model runs and interpretation*

If any modifications are made to the model coding, the code should be tested again; all QA procedures for model development should again be applied, including accurate record keeping and reporting.

The code documentation should include:

- *model specifications*
- *model description*
- *flow charts*
- *description of routines*
- *data base description*

- *source listing*
- *error messages.*

3.2 Discuss computer requirements for both hardware and software.

Identify computer requirements, including:

- *programming language (FORTRAN, BASIC, etc.) and ANSII standard*
- *model portability*
- *memory requirements*
- *required hardware/software for application*
- *data standards for information storage and retrieval (refer to Office of Environmental Information guidance - www.epa.gov/irmpoil8/polman/chaptr05.htm)*

When appropriate, a review of existing software should first be considered to determine capability for implementing the new model.

3.3 Discuss how the code will be verified.

The objective of the code verification process is to check the correctness and accuracy of the computational algorithms used to solve the governing equations and to assure that the computer code is fully operational.

The inspection of the computer code is part of the model review process. In this inspection, attention is given to the manner in which modern programming principles have been applied with respect to code structure, compliance with programming standards, efficient use of programming languages, and internal documentation. This step may reveal programming or logic errors that are difficult or impossible to detect in verification runs.

3.4 Describe the requirements for model documentation.

Model documentation is defined as the information recorded during the design, development, and maintenance of the model, in order to explain pertinent aspects, including purposes, methods, logic, relationships, capabilities, and limitations. It is the principle instrument of communication used by the model author, the model user, and the system operator.

Good documentation includes a description of (some of these may have been discussed previously):

- *the equations on which the model is based*
- *the underlying assumptions*
- *the boundary conditions that can be incorporated in the model*
- *the method used to solve the equations*
- *limiting conditions*

The documentation may also include:

- *user's guide (electronic or paper)*
- *source code*
- *instructions for preparing data files*
- *example problems complete with input and output*
- *programmer's instructions*
- *computer operator's instructions*
- *a report of the initial code verification*
- *documentation of significant changes to the model*
- *procedures for maintenance and user support, if applicable.*

SECTION 4.0 MODEL CALIBRATION

Model calibration is defined as the process of refining the model to achieve a desired degree of correspondence between the model output and actual observations of the environmental system that the model is intended to represent. Model development is an evolutionary process responding to new research results, developments in technology, and changes in user requirements. Model calibration needs to follow this dynamic process and should be applied each time the model is modified.

4.1 Discuss how the model will be calibrated.

Identify the type and source of data (e.g., new data, existing data, professional judgement, expert opinion elicitation) that will be used to calibrate the model. If data sources are not currently known, describe the criteria used to identify sources.

4.2 Describe any requirements for the data that will be used to calibrate the model.

Calibration data requirements with respect to quality, quantity, and spatial and temporal applicability should be specified, as applicable.

4.3 Specify criteria which need to be met for the difference between predicted and observed data during model calibration.

The acceptance criteria which need to be met for the difference between predicted and observed data should be specified. The statistical methods to be used (e.g., "goodness-of-fit," regression analyses) should also be discussed. If criteria cannot be specified, this should be discussed.

SECTION 5.0 MODEL ASSESSMENT (VALIDATION) AND APPLICATION

5.1 Discuss the assessments planned to ensure the acceptability of model outputs.

This element of the QAPP documents the types of assessments to be performed

throughout the various stages of model development and application, the purpose of each assessment and the specific model features that each assessment is to address, and the expected periods of time in which the assessments will take place. Details regarding how the assessments will be performed and by whom need to be provided. The specific assessments are based on a clear understanding and statement of the purpose of the model and the accuracy of the model outputs needed (predictions).

In general, this QA Project Plan element specifies the following types of information:

- *a description of the assessment/oversight strategies and schedule of assessment activities, including the order in which the assessments will be conducted and how the total set of assessments is structured to provide a complete and comprehensive oversight;*
- *a description of how each assessment will be planned and conducted;*
- *the organizations and individuals that are expected to participate in assessments, including peer reviews;*
- *the information expected, success criteria, and documentation for each assessment.*

Additional guidance on assessments is provided in EPA QA/G-5M (www.epa.gov/quality/qa_docs.html).

5.2 Identify any restrictions on the use of the model.

Restrictions on model application should be outlined. Categories of restrictions include:

- *assumptions*
- *parameter values and sources*
- *boundary and initial conditions*
- *validation/calibration of the model*
- *output and interpretation of model runs*

If any of these items has been presented and discussed previously, inclusion here is not necessary.

SECTION 6.0 REFERENCES

Provide references to methods and applicable publications.

REFERENCES

EPA, Environmental Research Laboratory. Quality Assurance Guidelines for Modeling Development and Application Projects, November 1991.

EPA QA/G-5M. 2002. Guidance for Quality Assurance Project Plans for Modeling.

van der Heijde, P.K.M. 1989. Quality Assurance and Quality Control in Groundwater Modeling. IGWMC Groundwater Modeling Publications, Holcomb Research Institute, Butler University, Indianapolis, IN:25.

QUALITY ASSURANCE SURVEILLANCE PLAN
Task Order 004, RTI EP-C-11-036

TITLE – Phase 4 Evaluation of the Aerosolization of Asbestos and Related Fibers from Bulk Materials

TASK ORDER MANAGER – Williamm Barrett

Performance Objective (Task)	Performance Standard (PS)	Surveillance Plan (SP)	Contractor Incentive (CI)	✓ or X
Task 1: Report Preparation and Peer Review	Contractor provides full and complete documentation of the results of all testing and model development.	TOM will document whether receipt of deliverable is timely. TOM will document whether quality of deliverable is at an acceptable level.	TOM will address compliance in PPE	✓
Task 2: Conduct of RAFS Sampling and Sample Analysis (Optional)	Contractor will provide laboratory sample analytical reports as required by the analytical method.	TOM will document whether receipt of deliverable is timely. TOM will document whether quality of deliverable is at an acceptable level.	TOM will address compliance in PPE	✓